III. Remarks

Reconsideration and re-examination of this application in view of the above amendments and the following remarks is herein requested. Claims 1-3, 5, 7, 9-13, 16, and 17 are pending in the application. Claims 4, 6, 8, 14, and 15 have been cancelled, and claims 12, 13, 16, and 17 have been withdrawn. By this paper, claim 1 has been amended. No claims have been added. Support for the above amendments is found in Applicants' specification as originally filed.

In the Specification

Specification paragraph [0002] has been amended to address clerical errors. Entry of these amendments is respectfully requested.

Claim Objections

Claim 1 was objected to because of informalities. Specifically, the Applicants have been advised to change "at least *of one* a" to "at least *one of* a" for clarity. Applicants have amended Claim 1 accordingly.

The amendments to the claims contained herein are of equivalent scope as originally filed and, thus, are not narrowing amendments. Entry of these amendments is respectfully requested.

Rejections Under 35 U.S.C. § 112, para. 1

Claims 1-3, 5, 7, 9, 10, and 11 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. More specifically, the Examiner has stated that new matter is contained in the amended claim 1. This rejection is respectfully traversed.

To satisfy the written description requirement, a patent specification must describe the claimed invention in sufficient detail that one skilled in the art can reasonably conclude that the inventor had possession of the claimed invention. MPEP § 2163 (citing *Moba, B.V. v. Diamond Automation, Inc.*, 325 F.3d 1306, 1319 (Fed. Cir. 2003); *and* citing *Vas-Cath, Inc. v. Marhurkar*, 935 F.2d 1555, 1563 (Fed. Cir. 1991)). Early opinions suggest that the Patent and Trademark Office was unwilling to find written descriptive support when the only description was found in the claims; however, this viewpoint was rejected. MPEP § 2163 (citing *In re Koller*, 613 F.2d 819 (CCPA 1980) (original claims constitute their own description); *and* citing *In re Gardner*, 475 F.2d 1389 (CCPA 1973); *and* citing *In re Wertheim*, 541 F.2d 257 (CCPA 1976)). "It is now well accepted that a satisfactory description may be in the claims or any other portion of the originally filed specification." MPEP § 2163. The proscription against new matter prevents the introduction of new matter that goes beyond the subject matter originally filed. *Id.*

The Examiner has stated that the elements of claim 1, including a first linear accelerometer and a second linear accelerometer mounted to the vehicle in separate locations, and a third linear accelerometer and a fourth linear accelerometer mounted to the vehicle in separate locations, constitute new matter. Applicants disagree and respectfully assert that the current elements contained in claim 1 do not constitute new matter, and further, that support for the amended claim 1 may be found in the specification as originally filed.

Specifically, original claim 4, which has been cancelled, recited that the sensors are linear accelerometers. Further, para. [0007] states "the sensors may all be linear accelerometers." Further yet, para. [0014] states "In some embodiments, the sensors 14 measure the linear acceleration at a particular location where the

sensor is mounted to the vehicle." Still further yet, para. [0015] states, "the sensors 14 (identified individually as S_1 and S_2) are in known and fixed positions...," and para. [0016] states "The sensors S_i measure the linear acceleration at the location P_i." Still further yet, para. [0017] refers to "an array of single axis accelerometers." In paras. [0020] – [0022], the sensor models for laterally oriented sensors, vertically oriented sensors, and longitudinally oriented sensors are given.

In addition, original claim 6, which has been cancelled, recited "The system of claim 1 wherein the sensors include two accelerometers that measure accelerations in a first direction and two accelerometers that measure accelerations in a second direction." Further, para. [0026] states "four accelerometers can be used for the sensors 14." Further yet, para. [0026] states "Other examples of hybrid systems include, but are not limited to, two lateral and two vertical sensors; two lateral, two longitudinal, and two vertical accelerometers; and two lateral, two vertical, and angular rate sensor."

The Examiner has stated "Applicant's fig. 2 shows only two sensors S1 and S2 located at separate positions. Therefore applicant's plurality of sensors are limited to 2 sensors S1 and S2." This statement inaccurately limits the claims to one embodiment of the specification. As stated above, the specification gives support for other embodiments, in addition to the embodiment of Fig. 2. For example, Applicants have clearly stated that the plurality of sensors is *not* limited to the two sensors S1 and S2, and that four sensors could be used. Original claim 6 was even more specific, reciting that two accelerometers measure accelerations in a first direction, while two accelerometers measure accelerations in a second direction. Responsive to the Examiner's stated concern that only two sensors are located at separate positions, the Examiner has taken the specific example related to S1 and

S2 out of context. For example, paragraph [0015] states, "Here the sensors 14 (identified individually as S_1 and S_2) are in known and fixed positions on the vehicle body 12 and the orientation of the measurement axes of the sensors S_1 and S_2 are known and fixed. Specifically, the location and orientation of a sensor S_i is provided by the relation P_i (x_i, y_i, z_i, θ_i, X_i, φ_i) (1), where x_i, y_i, z_i, are the space coordinates of the sensor S_i...." Paragraph [0016] states "The sensors S_i measure the linear acceleration at the location P_i...." Further, paragraphs [0020] – [0022] give the sensor models for laterally oriented sensors, vertically oriented sensors, and longitudinally oriented sensors, which is evidence that at least three sensors S_i could be implements at locations P_i. Further, para. [0026] states that four accelerometers may be used. Thus, it is clear that S_1 and S_2 are specific examples for the sensors S_i, which are located at locations P_i having spatial coordinates x_i, y_i, and z_i. The specification, including the original claims, clearly contemplates more than two sensors, for example, four sensors, or sensors oriented in the lateral, longitudinal, and vertical directions, located at locations P_i and being one of the sensors S_i, which may be located in separate locations similarly to the examples S_1 and S_2. One having ordinary skill in the art would have interpreted the four sensors to be oriented and positioned as described above, based on the description as a whole and his/her knowledge and skill in the art.

Responsive to the Examiner's statement, "Applicant does not indicate that the four accelerometers must be 'linear accelerometers' as claimed," as noted above, there are numerous places throughout the specification and claims as originally filed which state that the accelerometers may be linear accelerometers or may measure acceleration in a linear direction. This multitude of references to linear accelerometers and linear acceleration measurements would have informed one

having ordinary skill in the art that the four sensors could be linear accelerometers. Applicants are not required to use a string of adjectives every time they refer to the sensors of the present invention. Further, the use of the words "vertical," "lateral," and "longitudinal" to describe the accelerometers also denotes that linear accelerometer are being used, as opposed to angular rate sensors, as one having ordinary skill in the art would understand.

Responsive to the Examiner's statement, "Applicant further does not disclose the positioning relationship of the four accelerometers," Applicants respectfully assert that one having ordinary skill in the art would know that the immediately preceding paragraphs, which describe the positioning relationship of the sensors S_1 and S_2, as well as the positioning of sensors S_i, would likewise apply to the positioning of the four sensors.

For the foregoing reasons, Applicants respectfully submit that they have met the written description requirement. Therefore, Applicants respectfully request that the Examiner withdraw the rejection of claims 1-3, 5, 7, 9, 10, and 11, and allow these claims.

Rejections Under 35 U.S.C. § 112, para. 2

Claims 1-3, 5, 7, and 9-11 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner has stated that the use of the words "separate locations" is unclear. Applicant has amended claim 1 to clarify these words, and entry of these amendments is respectfully requested.

Rejections Under 35 U.S.C. § 103

Claims 1-3, 5, 7, and 9-11 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Pub. No. 2005/0149240 to Tseng et al. (Tseng), in view of U.S. Pat. No. 4,865,346 issued to Fukushima et al. (Fukushima). This rejection is respectfully traversed.

Independent claim 1, from which claims 2, 3, 5, 7, and 9-11 depend, is directed toward a system for estimating body states of a vehicle. The system includes four linear accelerometers. The first and second linear accelerometers are mounted to the vehicle in separate locations from each other. Likewise, the third and fourth linear accelerometers are mounted to the vehicle in separate locations from each other. The first and second linear accelerometers are configured to measure the acceleration of the vehicle in a first direction and generate measured vehicle state signals based on the acceleration of the vehicle in the first direction, and the third and fourth linear accelerometers are configured to measure the acceleration of the vehicle in a second direction and generate measured vehicle state signals based on the acceleration of the vehicle in the second direction. Further, claim 1 includes a signal adjuster configured to transform the measured vehicle state signals from a sensor coordinate system to a body coordinate system and a filter configured to receive the transformed measured signals from the signal adjuster and process the measured signals into body state estimates of the vehicle. The body state estimates include at least one of a roll rate, a roll angle, and a yaw rate.

Tseng discloses a system for controlling a safety system of a vehicle with multiple sensors (p.2, para. [0025]). A lateral acceleration sensor 32 measures the acceleration of a vehicle in a first direction, a vertical acceleration sensor 35 measures the acceleration of the vehicle in a second direction, and a longitudinal

acceleration sensor 36 measures the acceleration of the vehicle in a third direction (pp. 3-4, paras. [0042] – [0043]). Each of these sensors 32, 35, 36 is mounted at the center of gravity of the vehicle (p. 2, para. [0025), or if they are located off of the center of gravity, they may be translated thereto (p. 3, para. [0032]); however, even if located off of the center of gravity, there is no mention that the acceleration sensors 32, 35, 36 would be located at separate locations *from each other*. A controller 26 receives information from a number of sensors, which may include speed sensors 20, a yaw rate sensor 28, a lateral acceleration sensor 32, a roll rate sensor 34, a vertical acceleration sensor 35, a longitudinal acceleration sensor 36, a pitch rate sensor 37, and steering angle position sensor 38 (p. 3, para. [0031]). The controller determines an adjusted pitch angle in response to the longitudinal acceleration sensor, the vehicle speed sensor, and a pitch stability index (Claim 1). The controller determines an adjusted roll angle in response to the yaw rate signal, the wheel speed signal, the lateral acceleration sensor, and a roll stability index (Claim 1).

Fukushima discloses an actively controlled suspension system (Abstract). The system includes a lateral acceleration sensor 110, a longitudinal acceleration sensor 112, and four vertical acceleration sensors 114FL, 114FR, 114RL, and 114RR (Col. 10, lines 29-41). The lateral acceleration sensor 110 is provided for monitoring lateral acceleration, the longitudinal acceleration sensor 112 is provided for monitoring longitudinal acceleration, and the vertical acceleration sensors 114FL, 114FR, 114RL, and 114RR are provided for monitoring vertical acceleration at respective front-left, front-right, rear-left, and rear-right suspension systems (Col. 10, lines 29-41).

Tseng and Fukushima, in combination, fail to disclose first and second linear accelerometers mounted to the vehicle in separate locations from each other, which are configured to measure the acceleration of the vehicle in a first direction, and third and fourth linear accelerometers mounted the vehicle in separate locations from each other, which are configured to measure the acceleration of the vehicle in a second direction. To the contrary, no two of Tseng's acceleration sensors 32, 35, 36 are configured to measure acceleration in the same direction as any other of the sensors 32, 35, 36, and further Tseng's acceleration sensors 32, 35, 36 are not mounted at separate locations from each other.

Similarly, although Fukushima discloses several vertical acceleration sensors mounted in separate locations from each other, which are each configured to measure acceleration in a vertical direction (a first direction), Fukushima does not disclose third and fourth linear accelerometers configured to measure acceleration in a second direction. Instead, Fukushima discloses only one acceleration sensor configured to measure acceleration in a second direction (lateral direction), and one other acceleration sensor configured to measure acceleration in a third direction (longitudinal direction). Further, neither Tseng nor Fukushima teaches a signal adjuster and a filter that are configured to transform and process measured vehicle state signals generated by the first, second, third, and fourth accelerometers into body estimates of the vehicle, such as a roll rate, a roll angle, or a yaw rate. Since the control systems of Tseng and Fukushima do not receive signals from two accelerometers configured to measure acceleration in a first direction and two accelerometers configured to measure acceleration in a second direction, they cannot teach apparatuses that transform and process such signals into body state estimates.

In view of the foregoing, Applicants respectfully submit that even if Tseng and Fukushima were properly combinable, Tseng and Fukushima in combination fail to teach each and every element of the present invention, as set forth in claim 1. Accordingly, Applicants respectfully submit that independent claim 1, and claims 2, 3, 5, 7, and 9-11 dependent therefrom, are in condition for allowance, for at least these reasons. Therefore, reconsideration and withdrawal of the rejection is respectfully requested.

MPEP 2114 Rejections

The Examiner has given no patentable weight to the portions of claim 1 that state "generating measured ... state signals corresponding to", "which receives the transforms [sic]", etc. The Examiner has invited the applicant to overcome the MPEP 2114 rejection by amending the claims to read, for example, "configured to measure ... state signals", etc. Applicants have amended claim 1 similarly to this suggestion, and entry of these amendments if respectfully requested.

SUMMARY

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot, and that pending claims 1-3, 5, 7, 9-13, 16, and 17, as amended, are patentable. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will

expedite prosecution of this application, the Examiner is invited to contact the undersigned at (734) 302-6000.

Respectfully submitted,

September 20, 2007
Date

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